A Visualization Approach for Projecting Future Distributions of North American Bioclimates

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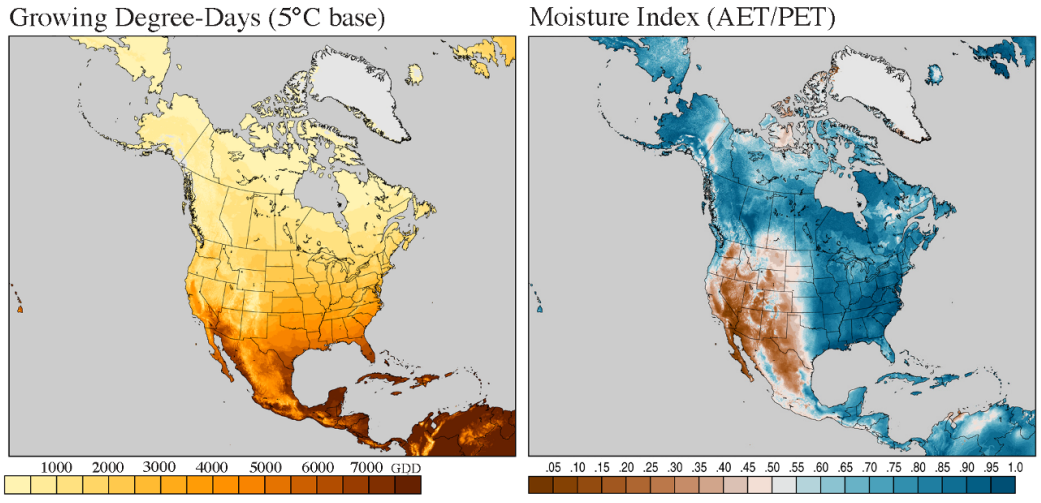
Summary: Conservation and natural resource managers require information about potential future climate changes for the areas they manage, in terms that are relevant for the species and ecosystems likely to be affected by climate change. This project will produce a suite of climate and climate-derived data sets and a visualization approach that will allow managers to map where: (1) a managed area's potential future climate is located on today's landscape (i.e., the locations of the modern analogues of future climate); and (2) the areas to which the present climate of managed areas are projected to move (i.e., the locations of the future analogues of present climate).

We will produce downscaled climate data from historical (1901-2000) data sets and from future (2001- 2100) climate simulations, generated by both coupled atmosphere-ocean general circulation models (AOGCMs) and regional climate models (e.g., RegCM3). Data will be downscaled at a relatively coarse spatial resolution (10-km) for North America, and at a finer resolution (e.g., ~1- km) for the contiguous US and Alaska. Based on discussions with land managers, we will use the climate data as input to existing environmental models to derive additional variables, such as bioclimate variables (e.g., moisture indices), that are required for management of specific resources (e.g., vegetation and habitat). Climate analogues will be calculated from the climate and bioclimate data. The results will be incorporated into an on-line web interface that will allow managers to produce maps of future climate analogues and to download the underlying climate data.

The Wildlife Conservation Society, Bozeman, Montana, and the US Forest Service are partners with the USGS and University of Oregon for this study.



Data: CRU CL 2.0 [http://www.cru.uea.ac.uk/]
Data Treatment: Elevationally adjusted interpolation onto a 10-km grid
Image: Dept. Geography, Univ. Oregon [http://geography.uoregon.edu/envchange/]

Figure 1. Bioclimatic variables on a 10-km grid of North America (1961-1990 30-year means). Growing degree-days (left) describe energy-related constraints on species distributions better than seasonal temperature variables and can be obtained from standard climatological data sets. The moisture constraints on plant growth are represented by the ratio of actual to potential evapotranspiration (or Priestley-Taylor alpha, right). (Figure: P. J. Bartlein, Univ. of Oregon)